the invention of José Guardiola. of Chocolá, Guatemala, and was patented by him through the Scientific American Patent Agency, April 30, 1872.

The invention consists in making the pestle, which is conical in form, with projecting ribs of various lengths, thereby forming grooves, in which the grains work their way upward by friction, and are thus divested of the external husks of pellicles it is desired to remove.

The pestle is operated by moving it up and down in the mass of grains to be hulled. The grains are thus crowded into and through the grooves, which, it is claimed, acts effectively to speedily accomplish the hulling.

FROM THE ATLANTIC TO THE PACIFIC.

A recent number of *Harper's Magazine* contains the following interesting description of the cars used on the Pacific Railway:

"From Chicago to Omaha, your train will carry a dining car, which is a great curiosity in its way. I expected to find this somewhat greasy, a little untidy, and with a smell of the kitchen. It might, we travellers thought, be a convenience, but it could not be a luxury. But in fact it is as neat, as nicely fitted, as trim and cleanly, as though Delmonico had furnished it; and though the kitchen may be in the forward end of the car, so perfect is the ventilation that there is not even the faintest odor of cooking. You sit at little tables which comfortably accommodate four persons; you order your breakfast, dinner, or supper from the bill of fare which, as you will see below, contains a quite surprising number of dishes, and you eat, from snow white linen and neat dishes, admirably cooked food, and pay a moderate price.

"Beyond Omaha, unless you have taken seats in a hotel car, you eat at stations placed at proper distances apart, where abundant provision is made, and the food is, for the most part, both well cooked and well served. These hotel stations are under the supervision and control of the managers of the roads, and at many of them, especially on the Central Pacific road—in California, that is to say—your meals are served with actual elegance. Sufficient time is allowed—from thirty to thirty-five minutes—to eat; the conductor tells you beforehand that a bell will be rung before the train starts, and we always found him obliging enough to look in and tell the ladies to take their time, as he would not leave them.

"There is a pleasant spice of variety and adventure in getting out by the way side at the eating stations. We saw strange faces, we had time to look about us, the occasional Indian delighted the children, we stretched our legs and saw something of our fellow passengers in the other cars. Moreover, if you have a numerous party desirous to eat together, the porter will telegraph ahead for you to have a sufficient number of seats reserved; and thus you take your places without flurry or haste, and do not have your digestion spoiled by preliminary and vexatious thoughts about pushing for a good place. In short, these trains are managed for the pleasure and accommodation of the passengers. The voyage would, I suppose, be unendurable else.

"The sleeping car, but for which the journey to the Pacific by rail would be extremely uncomfortable, but by whose help it is made a pleasure trip, owes its development and perfection to Mr. George M. Pullman, who is the inventor and patentee of most of the ingenious devices by which the traveler's comfort is secured in these cars. Of course he is an American. He began life poor, was once a miner in Colorado, and was, I believe, so poor when he began the experiment of his sleeping cars that it was with great difficulty he raised the means to build his first car. He is now president of the Pullman car company, which has five hundred sleeping, drawing room and hotel cars on different railroads, and is building more, at the rate of three finished cars for every week of the present year. The company is also building a new kind of day cars, to be put on such short routes as that between New York and Washington; and by the time you are reading this, it will run a daily hotel car from Chicago to Ogden, in which you may sit and sleep, and have your meals served at any time you may choose to order them. It is planning, and will fit up this year near Chicago, extensive car works of its own on grounds large enough to contain also the cottages of the thousand workmen who will be there employed; and it is said that these grounds are to be planned with special regard to the convenience of the men and their families. The company has already found it expedient to keep and furnish, near the depots in all the great cities, rooms where conductors or porters may, at the end of a journey, bathe, change their clothes, make out their reports, and read, write, and amuse themselves. Mr. Pullman thinks that, as he requires much from his men, and as they are picked men, trained with care, it is an advantage to the company to furnish them such a home at the ends of the routes of travel, where they make themselves comfortable and at ease. Certainly it is a humane thought and likely, besides, to give him the command of responsible servants.

"The Pullman cars are constantly improving. The Russian Grand Duke traveled last winter in perhaps the most commodious and perfect manner in which any one ever traveled by rail. He had in one train a day car, in which he and his companions could sit at ease, read, write, or amuse themselves as in a parlor; a dining or hotel car, into which they passed to breakfast or dinner; and a sleeping car. No doubt the impressions he got of this kind of pleasure traveling will facilitate Mr. Pullman's entrance into Russia, where, as well as in England, Germany, and France, the Pullman company will within two years have placed their cars, as arrangements are now making for that purpose.

"The superiority of the American sleeping cars is in their cleanliness, the perfection of their heating and ventilating contrivances, and the presence of everything which can make a car convenient to live in. There is nothing like them in Europe, and all European travelers in this country have been surprised and delighted with them. The Pullman company is successful, as it deserves to be. It now runs cars on nearly one hundred roads, the railroad companies generally owning one half the stock of the cars they use, and thus having a mutual interest. The Pullman company sells to the public what the railroad company in such cases does not furnish—the sleeping car accommodations. You may now ride in Pullman cars over sixty thousand miles of railroad. The Pullman company already employs over two thousand persons, and in its new car shops will employ one thousand more; and all this vast business has grown from the smallest beginnings.

"One of the pleasantest ways to travel across the continent, though not, I think, the way in which you will see most of the people, is to make the journey with a party of friends numerous enough to fill or nearly fill, a car. To show you at what cost—exclusive of the regular railroad fare—such a company may journey, I give you here some extracts from a little book issued, for the information of travelers, by the company:

"For a regular sleeping car, containing twelve open sections of two double berths each, and two state rooms of two double berths each, (in all twenty-eight berths,) with conductor and porter, seventy-five dollars per day.

"For a drawing room car, containing two drawing rooms having each a sofa and two large easy chairs by day, and making up at night into two double and two single berths, three state rooms having each two double berths, and six open sections of two double berths each, (in all twenty-six berths) with conductor and porter, seventy-five dollars per day.

"For a hotel car, containing two drawing rooms, as above described, one state room, having two double berths, and six open sections of two double berths each, (in all twenty-two berths, (and having also, in one end, a kitchen fully equipped with everything necessary for cooking and serving meals, with conductor, cook, and two waiters, eighty-five dollars per day.

"The Pullman hotel car is one of the most ingenious, as well as the most convenient, of modern arrangements for travel. It can seat forty persons at the tables; it contains not only a kitchen—which is a marvel of compactness, having a sink, with hot and cold water faucets, and every 'modern convenience'—but a wine closet, a china closet, a linen closet, and provision lockers so spacious as to contain supplies for thirty people all the way from Chicago to the Pacific, if necessary; its commissary list contains, as I ascertained by actual count, 133 different articles of food; it carries 1,000 napkins, 150 table cloths, 300 hand towels, and 30 or 40 roller towels, besides sheets, pillow cases, etc., etc. And unless you are of an investigating turn, you would never know that the car contained even a kitchen.

"Whenever a sleeping car arrives at the end of a journey, it is laid over for twenty-four hours. Thereupon the porter gathers up the soiled linen for the laundry, and a force of men and women enter the car and take out of it bedding, carpets, and every movable thing; all are beaten with rods and hung up to air; and meantime the whole car is aired, and the woodwork dusted, rubbed, and scrubbed in the most thorough manner. This is the manner of their housekeeping."

The Hartford Steam Boiler Inspection and Insurance Company.

The Hartford Steam Boiler Inspection and Insurance Company makes the following report of its inspections in the month of April, 1872:

During the month, 823 visits of inspection were made, and 1,652 boilers examined—1,605 externally, and 563 internally—198 were tested by hydraulic pressure. Most of these latter were new boilers, in the yards of boiler makers, which we were called to examine previously to their being put in use. Number of defects in all discovered, 1,264, of which 286 were regarded as dangerous. Many of these boilers were in iron works, furnaces, and rolling mills, and were operated by the waste heat, which is often very severe in its effects on boilers. Furnaces out of shape, 51—3 dangerous; fractures in all, 164—65 dangerous. These cases were found mostly in boilers that had been used for some years and overworked, or in those which had accumulated quantities of deposit, and which were badly scaled. Burned plates, 82—29 dangerous; blistered plates, 137—21 dangerous; cases of sediment and deposit, 166—28 dangerous; cases of incrustation and scale, 200—27 dangerous; cases of external corrosion, 79—25 dangerous; cases of internal corrosion, 36—5 dangerous. Internal corrosion is usually the result of impure feed water. Water in and about chemical works is very bad indeed, and such boilers should be fed from streams or pools having no connection whatever with the works. We have of late been obliged to condemn the boilers of a large manufactory of this kind, because, upon examination, they were found in a very dangerously corroded condition. When the feed water for boilers cannot be obtained from sources that are pure, that is, free from acids, carbonate of soda has been found beneficial, and is used quite extensively in England. Cases of internal grooving, 47—10 dangerous; water gages out of order, 40—6 dangerous; blow out apparatus defective, 30—5 dangerous. One great trouble with this last fitting is that it is often partly imbedded in brickwork; the valves and connections are poor or defective, and the result is they leak, and the water in the boiler is found to be low, when the real cause is not understood. Hence the pipes which connect blow out cocks to the boilers should be easily accessible, and in no case should they be imbedded in masonry. Safety valves overloaded and defective, 31—23 dangerous; boilers without gages, 10—7 dangerous; pressure gages defective, 76—17 dangerous, varying from —10 to +7. Cases of deficiency of water, 7—2 dangerous; broken braces and stays, 44—15 dangerous; boilers condemned, 13.

Artists with Bad Eyes.

Rarely, perhaps never, has the skill of the surgeon been demonstrated in such an interesting manner as in the recent artistic researches of Mr. Liebreich. This eminent ophthalmist has lately been lecturing at the Royal and London Institutions on the effect of certain faults of vision on painting, with especial reference to the works of Turner and Mulready. His lectures have excited much interest, especially among artists and art patrons. And his lucid, carefully elaborated demonstrations, which he enforces with almost mathematical precision, lead the great majority of his hearers to the conclusions which he has formed. Mr. Liebreich truly says that many connoisseurs elevate the faults in Turner's paintings into peculiarities of style, and some would even go so far as to form a school to imitate that style. Turner's earlier paintings were not disfigured with the haziness and falsity of proportion which marked his later productions; and these faults the lecturer exactly reproduced to his audience by throwing a landscape or a tree on the screen, and then by interrupting the rays between the picture and the reflection by a lens so constructed as to diverge them to such extent as, according to this theory, they were diverged in the case of Turner. Turner's defect of vision was what is known as "astigmatism," that is, the vertical rays and the horizontal rays of light were not brought to his sight at exactly the same focus. Hence arose the vagueness and incorrect proportions we have referred to. Turner painted from Nature exactly as Nature appeared to him, but not as it appeared to him when his sight was truthful. Mulready's defect was a yellowness in the crystaline lens of the eye, which came on with age, and which occasioned a comparative failure of perception of blue colors. The result was that the artist added his blue tints much too extravagantly, and presented ploughboys in smock frocks as though they had been clothed in purple. Mr. Liebreich's opinions are endorsed by many of the ablest scientific and artistic authorities, and, as we said, seem to be conclusively established by his arguments.—*Chemist and Druggist.*

Expeditions to the North Pole.

According to advices from Stockholm, the projected north polar expedition, under the control of Professor Nordenskiold, is almost ready for sea, and Swedish geographers entertain great hopes of success for the new undertaking. The expedition will have on board, besides Professor Nordenskiold, Lieutenant Palander, of the Swedish navy, who has already had some experience in polar exploration, having accompanied the Swedish expedition of 1868; also a physician, a physicist, and several other servants, who will accompany the expedition for the summer, returning from Spitzbergen in the autumn; making in all, with the crew, twenty persons. The principal object of the expedition, which is not expected to return before the summer or autumn of 1873, is to reach the pole from high latitudes by means of sleighs drawn by reindeer—an enterprise in which the German geographer, Dr. Petermann, of Gotha, does not place much faith. The expedition will take with it from Gothenburg a portable house, of nine rooms and kitchen, which is to be put up on the Seven Islands, in 80° 38′ northern latitude—the most northern point at which an expedition has ever wintered in these regions. Great importance appears to be attached by Professor Nordenskiold to the cargo of fifty reindeer, which he will ship from Norway, together with the necessary fodder and a number of Lapps to attend them.

Dr. Petermann and the great majority of the German geographical societies have given their entire support to the new Austrian expedition, which is to sail from Bremerhaven about the end of June, and which Dr. Petermann greets as "the greatest event in the history of modern arctic explorations." The object of the Austrian expedition will be the farther navigation of the ice-free ocean which they met with last summer to the east and north, and the exploration of the arctic ocean to the north of Siberia. The plan of the voyage is as follows: The expedition being provisioned for a period of three years, the first winter is to be spent on Cape Tschelinskin, the most northern promontory of Asia; during the second summer the exploration of the central polar ocean is to be continued, and an effort made to reach the pole; the second winter will be spent on the new Siberian island, and the third summer will be employed in reaching Behring's Straits and an Asiatic or American haven. The Austrian expeditionary vessel is a three masted schooner, 118 feet long, 25½ broad, 13½ deep, provided with an effective engine of 95 horse power, and coals for forty days.

A TABLESPOONFUL of quicksilver was lately found in an old grave in York county, Pennsylvania. It is supposed to have been buried there in the shape of calomel within the patient. —*Exch.*—[In old times, the doctors sometimes administered pure mercury as a medicine; a more common form of mercurial administration was the blue mass. Either of these prescriptions would account for the presence of quicksilver; but dosing with calomel would not.—EDS.]

BY a single blast of nitro-glycerin, at the Hoosac tunnel, North Adams, Mass., the rock was blown out in the center of heading to a depth of eight feet ten inches.

Nature of the Action in Galvanic Batteries.

Professor G. W. Hough, Director of the Dudley Observatory at Albany, N. Y., has made a series of experiments on galvanic batteries, extending over several months, for the purpose of investigating the cause of the decline in the strength of the electric current after the battery has been in operation a long period. It is well known that, since the invention of the American method of recording transits, the galvanic battery has become one of the necessary instruments in every first class observatory. The application of electricity also to the registration of meteorological phenomena makes it desirable to secure the best form of battery, as well as to be able to know what is the difficulty when the battery begins to fail in its work. Some of the leading conclusions reached by Professor Hough were as follows:

1st. In the sulphate of copper battery (Daniell's form) the principal cause of decline in the strength of the electric current is due to the formation of sulphate of zinc.

2d. The quantity of electricity flowing in the external circuit depends upon the specific gravity of the sulphate of zinc.

3d. When the sulphate of zinc approaches saturation, polarization takes place in the battery itself; and, although the electromotive force remains the same, the internal resistance may be increased more than a hundred times.

4th. The sulphate of zinc (or any fluid about the zinc) is only useful as a conductor of electricity.

5th. The copper, or negative metal, is useful only as a conductor, since it may be replaced by any other metal, even zinc itself.

6th. The internal resistance of the battery has been separated into two parts, namely, that due to the porous cell and that due to the liquids employed. The specific resistance of the liquid was found to be 13; that for a small clay cell, 17, and for a leather cell, 7. Since the resistance of the leather cell is less than one half that of a clay cell, it has been used in the construction of batteries at the observatory, as the quantity of electricity is nearly doubled without any increase of surface. For the negative metal, in place of the copper hitherto employed, we have used sheet lead.

These investigations have rendered it possible to compute, with great precision, the length of time a battery will generate its normal quantity of electricity, provided the amount of electricity flowing in the external circuit is known, and the capacity of the vessel holding the sulphate of zinc is determined. The specific gravity of the sulphate of zinc should not be less than 15° or more than 38° degrees of Baumé.

A new mechanism for the more thorough investigation of galvanic batteries has been devised by Professor Hough, but not yet constructed, by which the quantity of electricity flowing in the external circuit will be recorded in the form of a curve so long as the battery is in action. This subject is one of great interest and importance, and it is proposed by Professor Hough to continue his investigation as circumstances may permit.

Swiss School of Milk Production and Management.

The Swiss Mountain Union, which has for many years been interested in the milk business, has issued a circular in which it claims that milk production and the care of the mountain pastures are the inseparable factors of the nation's wealth. The only article of export is cheese, which was exported in 1868 to the value of 18,674,832 francs, and in 1869, to 21,453,796 francs. The increase of milk products in other parts of the world is alluded to. American factory cheese, an imitation of the English Cheshire, is rivaling its prototype in its home market. Sweden and Denmark have established extensive dairies, while Holland, which controls the cheese trade of the world, has established at Utrecht a perpetual exhibition of dairy utensils, etc., for the instruction of dairymen. The Austrian minister of Agriculture has given two annual prizes for the benefit of cheese factory associations, while in Vorarlburg, Tyrol, Bavaria, Italy, and Prussia, the latest facts, principles, and improvements are disseminated by means of itinerant lecturers, fairs, exhibitions, and publications. It is proposed in Switzerland to adopt this policy in the organization of a school of theoretical and practical instruction in milk production and management. For this purpose, funds are to be raised from the cantons, agricultural societies, and individuals. Great results are anticipated from this enterprise.

Mesquite Gum.

Mr. F. Kalteyer, treasurer of the Agricultural and Industrial Association of Western Texas, says the mesquite gum of that region is almost identical with gum arabic, having been in use there for medicinal and technical purposes, especially in the preparation of mucilage, gum drops, jujube paste, etc. The past year it has become an article of export, some 12,000 pounds having been gathered in Bexar county, and as much more between that and the coast. No gum is gathered west of Bexar, though the drought was favorable to a large crop. This gum is hardly known east of the Brazos. It exudes from the stem and branches of a *mimosa*, several species of which grow in Texas, New Mexico, and Arizona. One of these species, *Algarobia glandulosa* (Torrey and Gray, N. A. F., 399), is rarely met with below the mountain region of western Texas. The species most common in Bexar county grows from twenty to forty feet high and eighteen inches thick. From it, charcoal is manufactured. It is generally used for picket poles, being very durable. It is also made into handsome furniture, the grain being very fine. It grows where no other fruit tree would live. It was favorably noticed in the last annual report of the American Pharmaceutical Association.

The Air We Breathe.

Dr. Angus Smith has gathered together and published the results of his investigations into air and rain, and those of the experiments made to determine their relative purity or impurity in various parts of the British Isles and on the Continent.

Numerous observers have experimented on the air and calculated the amount of oxygen it contains, and although formerly results differed, owing probably to defects in the *modus operandi*, latterly the analyses have come much nearer to agreement and minute accuracy. Gay Lussac and Humboldt gave the mean as 21·0 volumes per cent of oxygen. Cavendish, by making a series of 500 analyses, arrived at the conclusion that 20·833 was the mean amount, and later experiments have shown that he was not far out, Graham and Liebig both giving 20·9. Dr. Angus Smith found, from repeated analyses, the following percentage, which we extract from his table as characteristic situations:—

On the N. E. shore and heaths of Scotland	20·999
Outer circle of Manchester (not raining)	20 947
Open places, London, summer	20·950
In a sitting room, which felt close, but not excessively	20·890
In a small room with petroleum lamp	20·840
Theatre gallery, 10·30 p. m.	20·860
Theatre pit, 11·30 p. m.	20·740
Backs of houses, and about closets	20·700
Court of Queen's Bench	20·650
Under shafts of metal mines (average of many)	20·424
When candles go out	18·500
Worst specimen found in a mine	18·270
Difficult to remain in	17· 20

The cursory reader who does not stop to examine what these figures really mean will probably exclaim: What difference capable of affecting health can there be in the air of London and that of Scotland—20·999 against 20·950 per cent of oxygen? It is quite true that a mere deficiency of oxygen to the extent of 49-1,000ths may affect us but little, but that deficiency means something more than a mere absence to that extent of oxygen; it involves a question as to what has taken its place. Even so slight a difference as that between 20·999 and 20·980 is equal to 190 in a million, and if we put impurity into water at this rate, it amounts to 13·3 grains in a gallon. This amount, says Dr. Smith, would be considered enormous if it consisted of putrefying matter, or any organic matter usually found in waters. But we drink only a comparatively small quantity of water, and the whole 13 grains would not be swallowed in a day, whereas we take into our lungs from 1,000 to 2,000 gallons of air daily. We must remember, too, that the blood receives the air and such impurities as are not filtered out in its passage, whereas the stomach has powers of disinfection and destruction which render harmless many organic impurities contained in water. But if we take the air found in the pit of the theater, we find that the difference amounts to 2,590 in a million, and the importance of the minute analysis becomes evident.

In the course of his experiments, Dr. Smith constructed a leaden chamber in which the experimenter could shut himself up from the external air. This chamber contained 170 cubic feet of air when furnished with a table and chair, and occupied by one person. On a day when the temperature was 45°F. no difference in the air breathed was perceptible for 25 minutes; but when drawn from the top by moving an umbrella up and down, it seemed like a soft wind capable of producing a slightly pleasant feeling, being, however, utterly without the property of producing that cheering and exhilarating effect to which we are accustomed in a gentle breeze. The air was moist, and a specimen of it deposited water. After an hour, the well known organic smell noticed in a crowded school room was perceptible on moving about rapidly, and at the end of the experiment, which lasted 100 minutes, had an unpleasant flavor and strength, and persons who entered immediately the door was opened pronounced it very bad. Still, Dr. Smith says he did not feel uncomfortable, although the percentage of oxygen must have been reduced below the average found in the ordinary circumstances of daily life, showing the seductive and insidious character of breathed air. After a stay of 2 hours 20 minutes in the chamber, however, long inspirations became more frequent, and the air was found much less agreeable when breathed at the upper part by standing on a chair; at the end of three hours, the amount of oxygen was reduced to 19·61. In an experiment with burning candles, it was found that the amount of light was sensibly diminished, and when the candles went out, the percentage of oxygen was found to be 18·80*, and of carbonic acid 2·28. On entering the chamber with candles and a spirit lamp, the lights were speedily extinguished, and it was found impossible to rekindle them with matches, the ordinary wooden ones refusing to ignite. Still, it was possible to breathe without difficulty, although a feeling of discomfort was soon experienced. Afterwards gas was lit and burnt brilliantly; but on entering with candles after the gas had gone out, they were instantly extinguished. Nevertheless, it was still possible to breathe, although when Dr. Smith stood on a chair, he experienced a feeling similar to incipient faintness; "but the senses were not annoyed by anything beyond a feeling of closeness, by no means so unpleasant as a school room." This is an important fact, as Dr. Smith says, showing almost conclusively that organic matter is the cause of the unpleasantness to the senses on entering a school room; for there was comparatively little organic matter in the chamber, and the school room would have more oxygen than the chamber, the percentage found in the latter, after allowing the door to open for three persons to enter, being found to be only 17·45. The conclusion to be drawn from these experiments, therefore, is that the senses are bad and inefficient guides to the wholesomeness of air as regards the amount of oxygen and carbonic acid, save when the former is reduced and the latter increased to such an extent that the lungs seem to refuse to expand and the whole vital action is threatened with paralysis. Rooms, badly ventilated, which contain less than 20·7 per cent of oxygen are very unwholesome, and the necessity of taking into consideration the proportion of oxygen and carbonic acid in the sanitary inspection of factories and workshops is abundantly evident from the results obtained by Dr. Smith.

*Candles placed in a tin box over water, however, were found to burn till the oxygen was reduced to about 15·5 per cent: but in the lead chamber the candle is extinguished by the tallow refusing to melt. For this reason, miners incline their candles so that the flame may melt the grease.

Gathering Nicaragua Caoutchouc.

According to Paul Levy, the harvester of caoutchouc in Nicaragua goes to the middle of the forest to look for caoutchouc trees (*castilloa elastica?*), and when he has found one, he climbs to the top of the tree by the aid of a *gaucho* (a kind of hook) and by means of his gouge makes some zigzag incisions on the principal branches, communicating with each other, to form a kind of general gutter as far as the trunk. The gashes, which go through the bark, are only made on the under side of the branches, but on the trunk they are made all the way to the foot. Some trees give twenty pounds of caoutchouc; the liquid is received in calabashes, where it is coagulated by simply agitating and leaving to itself. To aid in coagulating, the natives use the stalks of certain branchy plants, which allow their sap to flow down and act as a coagulating agent. Caoutchouc of good quality cannot be obtained from trees less than fourteen years old. Unfortunately, the harvesting is done with little care, and the gashes almost always penetrate beneath the bark. A slightly larger yield is obtained, but it is destructive to the tree.

Preservation of Grain in Vacuo.

M. Louvel has brought before the French Academy a plan of storing wheat in portable sheet iron granaries, in which a vacuum is maintained equal to at least from three to four inches of mercury, this being found sufficient to destroy all insect life (although a more perfect vacuum is preferred) and to insure the evaporation of any moisture in the grain. The apparatus is of cylindrical form, placed vertically, and with convex top and bottom. The top is provided with an opening through which the inlet of the grain is had, with a valved pipe through which the air is exhausted, and with a gage by which the degree of exhaustion is indicated. The grain is removed through an opening (provided with a suitable closing device) in the bottom. The pump, which can be used for any number of the grain receivers, costs about one hundred and eighty dollars extra. In one experiment, where living insects were introduced in large quantities with the grain, it was found that they were all killed before doing mischief, and at the end of six months the wheat was found to be in as fine condition as at the outset.

M. LOUIS LA BRECHE VIGER, of Montreal, has obtained a patent for a new method of manufacturing axes, hammers, and other implements, by first making them of wrought iron and then converting them into steel. The articles to be treated are immersed in a bath of molten cast iron free from sulphur and phosphorus, and carburized to its utmost capacity. The best for that purpose is spiegeleisen, but such cast iron may be made by melting good malleable iron or blister steel in a cupola furnace. The articles are left in this bath a space of time which must vary, with the degree of hardness desired to be imparted to the metal and with the size of the articles, and also according to the intention of converting the whole mass of the metal into steel, or simply of converting the surface so as to contain a core of malleable iron.

A FEARFUL boiler explosion recently took place at Manchester, England. Five boilers, each 34 feet long and 5½ feet in diameter, were arranged side by side, each connected by a stand pipe with one horizontal steam pipe. Five safety valves were arranged on the horizontal pipe, one directly over each stand pipe; but no safety valves were directly on the boilers. During the repairing of one of the boilers, a workman had plugged up the stand pipe by which that boiler was connected with the horizontal steam pipe, and had neglected to remove the plug at the conclusion of the job. The consequence was that, when steam was raised, a terrible explosion took place, by which several lives were lost and much property destroyed.

USE OF SEWER WATER AS A MANURE.—According to the *Revue Horticole*, experiments with the sewer water of Paris, in the cultivation of certain lands below the level of the city, commenced three years ago, have been of the most satisfactory character: and the eagerness that the farmers now exhibit to obtain permission to use these waters on their lands, wherever it is practicable, is justified by the great increase in their value, many of them having previously been of little worth. Thus certain lands now rent for six and seven times as much per annum as formerly.

IT is curious how toothache gradually abates as you get nearer and nearer to the dentist's door. It seems almost as if your tooth were an intelligent being which turned coward when threatened, as bullies generally do. In such a case, the tooth has been made to understand that it was menaced, and has been frightened by a process of telegraphy between the mental and physical nerves.

THE interior of the Hoosac Tunnel has lately been photographed by the aid of magnesium lights, while the drilling machines were at work.